**Value Chain Analysis**

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**Section A. Partner Information**

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1. **Background and problem statement**

Collaborations - whether individual or collective action - of smallholder farmers with other partners within a value chain (VC) are shaped based on opportunities and constraints, but also on risks (Barrett, 2008; Mather et al., 2013) . For instance, farmers may take advantage of opportunities such as sales facilities, access to credit and inputs toward collective actions; they may encounter constraints, such as supporting a sunk cost for purchasing a non-divisible input (e.g. a tractor); and finally, they may be subject to various risks such as opportunistic behaviour from a transacting partner (Williamson, 1979). The occurrence of such risk and its eventual cost may generate huge variability in returns on investment, therefore discouraging collaborations. By referring to Kherallah et al. (2002), Bijman (2008) and Poulton et al. (2010), this explanation from transaction cost economics is often underscored as a possible reason of limited collaboration between farmers and other market partners (e.g. input and service providers, traders, processors and consumers) in a VC. One consequence of limited collaboration may be the limited use of sustainable intensification solutions. Moreover, UNIDO (2011) pointed out that, in addition to the previous factors, tangible and intangible resources, assets (e.g. technology) and capabilities (i.e. effective use of resources) influence the relationship of farmers with their environment, including the farming systems and the collaboration with VC partners.

Smallholders often represent a weak link in VCs (Donovan et al., 2015; Trienekens, 2011), in particular in Southern Mali due to constraints related to institutional (e.g. information and market facilities) and economic (e.g. cash flow and credit) settings. In addition, farmers in this region rely strategically on several VCs to sustain their livelihoods. For example, maize is cultivated for cash and food (Coulibaly et al., 2015), milk production provides regular income over year, and sheep fattening is undertaken by various members of the household (e.g. women and young) for their need of money (McDermott et al., 2010). Therefore, this research aims to understand the relationships between farmers and their partners in the mentioned VCs, and then explain the degree of collaboration, at three different levels (i.e. individual, organizational and institutional levels), using transaction cost economics as theoretical background. For this, the following research question is used to guide our investigation: which constraints, opportunities and risks from the enabling institutions shape the collaborations between farmers and other actors of the VCs within the crop-livestock farming systems of southern Mali? Furthermore, it’s hypothesized that risk and uncertainty rooted in institutional and economic constraints are the primary reasons of limited collaboration between farmers and other actors in the selected VCs.

The study will generate insights for how to improve collaborations between smallholders and other chain actors for a better bargaining position of the smallholders. The document is structured as follows: the first section is on background and problem statement, this is followed by the sections on materials and methods, then on results and discussions, and then on general conclusion.

1. **Materials and methods**

This study is conducted in the old basin of cotton production (Koutiala district) in southern Mali, where smallholders complementarily rely on crop-livestock farming to sustain their livelihoods.

1. **Justification of selected VCs and study method**

This research is conducted on maize, milk and sheep VCs, because (1) they are among major sources of income for smallholders, (2) represent different farming objectives (e.g. cash and/or food), (3) play complementary roles within the farming systems (e.g. cycling of nutrient between crops and livestock), (4) have different features (e.g. one harvest per year (maize), regular income over time (milk) and source of income for marginalized groups such as women and young people (sheep)), and (5) were prioritized by the farmers. Investigations were realized between December 2017 and February 2018 in the cotton zone of Koutiala in Southern Mali. Our approach used qualitative diagnosis of the VCs using key informant interviews (about twenty), focus group discussions (FGD) in five villages around Koutiala (Namposssela, M’Peresso, Nitabougouro, N’Tiesso and Signe), semi-structured interviews with actors of VCs (about thirty), and desk review to describe the relationships and institutions supporting them between farmers and their partners in the VCs. By so doing, maps of the relationships among actors (e.g. farmers, agri-businesses, traders, and processors) were also established.

1. **Contextual backgrounds of maize, milk and sheep VCs in southern Mali**

In the cotton zone of Koutiala (area covered by the North-Eastern filial of the CMDT)[[1]](#footnote-1) with a human population of 1 429 746 habitants, 16% (i.e. 134 920 ha) of total cropped land was cultivated with maize during 2016/2017 season (CMDT, 2017). Maize yield was approximately 2500 kg/ha and the local production of dry cereal (maize, millet and sorghum) per capita per year was estimated at 534 kg (CMDT, 2017), in which maize contributed 61%. It is important to note that, compared to millet and sorghum, maize has high yield, but also more potential for processing. In Mali, annual cereal per capita need is 214 kg (government report); therefore, this production area could provide about 457 518 tons to market. Also 95% of farmers who grew cotton in this cotton zone had cultivated maize too. All these farmers belong to a cooperative of cotton producers (SCPC). According to a report realized on Malian agricultural sector (RuralStruct, 2009) sold maize accounted for 10-25 % of total production of farmers. Another report (MA, 2011) suggests that between 1990 and 2009 maize production progressed at rate of 6.7% due to increase in both cultivated area and yield.

Malian milk production from cows is estimated approximately at 300 000 tons[[2]](#footnote-2) per year, from which the amount of milk collected represents only 1.5% (Rigourd et al., 2017). According to the authors, the southern Mali is very dynamic in milk collection through dairy units, particularly through collection centers and mini-dairies. In line with this, Sikasso region has 16 artisanal dairy units, including 2 mini-dairies in Koutiala. According to information provided by the "Service Local des Productions et des Industries Animales (SLPIA) de Koutiala ", processing rate of milk collected from the two mini-dairies is estimated at 67%. The Federation of National Dairy producers (FENALAIT) is the main network that works with many producers and cooperatives. However, it collaborates only with peri-urban producers, but not with agro-pastoralists from villages of Koutiala district (Rigourd et al., 2017).

The number of sheep is estimated at 15 143 415 heads[[3]](#footnote-3) according to the 2015 annual report of DNPIA (2016). This report suggests that the domestic consumption of sheep amounts to more than 400 000 per year, but Mali is also a big exporter of sheep. For example, exports of sheep in 2015 reached 788,171 heads in total and all the neighboring countries have imported from Mali. However, Senegal was the biggest importer of sheep from Mali. Also the report recognized that nationally sheep fattening is mainly done by women and young people before the Tabaski festival. In our study area (Koutiala district), the number of sheep is more than 200,000 heads according to the opinion of local veterinary professionals.

1. **Definition of concepts**

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| **Concepts** | **Definitions** |
| **Value chain** | We follow the definition by Riisgaard et al. (2011) who defines a VC as “actors connected along a chain producing, transforming and bringing goods and services to end-consumers through a sequenced set of activities”. |
| **VC partners** | VC partners retained in this study include inputs suppliers (e.g. seeds and animal feed), services providers (e.g. for plowing and animal care), financial institutions, producers and their cooperatives, market intermediaries (e.g. traders and collectors), processors and consumers; This is because they are the main partners with whom producers collaborate closely in Southern Mali. |
| **Institutions** | “Institutions include formal and informal “rules”; regular patterns of behaviour and various forms of organization across the state, business sector and civil society” (Vermeulen et al., 2008, p. 33). This broader definition includes also enabling policies and focuses on the relation between market actors, the actors themselves and the markets. |
| **Sustainable intensification (SI)** | “Producing more from the same area of land while conserving resources, reducing negative environmental impacts and enhancing natural capital and the flow of environmental services” (Wezel et al., 2015). |
| **Mixed farming systems** | Those systems in which more than 10% of the dry matter fed to animals comes from crop by-products or in which more than 10% of the total value of production comes from non-livestock farming activities. |
| **agro-pastoralists** | Rass (2006, p. 7) defines agro-pastoralist households as those that derive between 25 and 50%, and more than 50% of their income from livestock and from cropping, respectively. |

1. **Highlights of SI indicators[[4]](#footnote-4) and their metrics**

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| **Domain of SI** | **SI indicators (and their related metrics at community levels)** |
| **Productivity** |  |
| **Environmental** |  |
| **Economic** | * Income diversification: in the cotton zone of Koutiala, farmers simultaneously participate in several VCs, such as cotton, maize, millet, sheep, milk. For example in 2016-2017 total cropped land was allocated as follows according to the CMDT (2017): 26 % to cotton, 16 % to maize, 27 % millet, 29 % to sorghum, 3 % to fodder crops and 1 % to soya; * Market orientation: there is a complementarity between cash and food crops in the livelihoods’ strategies of households. For example, farmers grow cotton for only cash, cereals for food and cash, some of them produce milk for the market. |
| **Social** | * Gender equity: Indicators here include gender bargaining power within the community and variability and distribution of resources. There is at least one female and one youth organization working on either cash generating activities (e.g. sheep keeping), informal savings and credit, grouped paid labor or alltogether in every village covered in this study; * Social cohesion: indicators here include membership rates of organizations and civic participation in initiatives and projects. In line with this it can be noticed that more than 90 % of smallholders are members of a cooperative of cotton producers at the village level. In general, people in villages are also mobilized together to benefit and accompany development initiatives targeted to them; * Collective action: at village level smallholders sporadically participate in initiatives of collective action, such as grouped marketing of cereals. |
| **Human** | * Food security: In the 2016-2017 season the total cereal production could meet the need of more than the double of the population of this production area (CMDT, 2017) ). |

1. **Results**[[5]](#footnote-5) **and discussions**
2. **Factors influencing participation of smallholder farmers[[6]](#footnote-6) (inclusion or exclusion) in the VCs of maize, milk and sheep within the cold zone of Koutiala**

According to producers in four villages (N’tiesso, Nampossela, M’peresso and Nitabougouro), maize is grown currently thanks to the efforts of R&D by the development of new improved varieties and seeds, the introduction of new cultural techniques (e.g. compost and manure preparation). Findings from a study realized by Laris et al. (2015) support this opinion. According to farmers, the increase in maize cultivation area is due to the growing demand of maize grains for human consumption and poultry sector. They assert that maize cultivation helps many small producers to deal with the lean period between August and September because it’s the first crop that reaches the maturity before the other cereals (millet and sorghum) and can close its production cycle before the end of the rainy season. They recognize that it is also the first income for certain producers among the cereals.

According to farmers, on the one hand well-resource endowed farm households (with and without large herds) grow maize because they own all the equipment and often have access to organic manure and chemical fertilizers. These farm households are better able to realize crop cultivation operations in time at the beginning of the rainy season. On the other hand, the least resource endowed farm households may grow maize with more difficulties because of the lack of access to material.

Milk production is mainly undertaken by well-resource endowed agro-pastoralists with large herds of cows (particularly with local breeds) and other farmers as a way to diversify their income. Milk production is not generally their main activity. According to them, milk production is confronted with a couple of difficulties that limit their participation in milk VC, in particular the challenge to supply cows with feed and water all over the year. This is supported from the findings of Cibils et al. (2015) that livestock productivity in Mali is currently limited due to animal feeding challenges.

Small ruminants, especially sheep, are often raised by women and young people within farm households as a cash generating activity. According to McDermott et al. (2010) sheep keeping plays various roles for these people, including “insurance” and “emergency cash”. They keep until about ten head of sheep but in general the number is limited to a couple of muttons, mainly due to their lack of money and labour to feed them adequately. According to some development agents, women often give better care to animals compared to the men and to the young people, because this constitutes for them the first income source. Also, young people sometimes practice sheep fattening as way to obtain money before migrating.

1. **Gender activity profiles in the VCs**

In southern Mali, there is a strong division of activities within households and tasks based on gender and sex. For example, farming activities such as cotton, maize and milk production are preferably undertaken and controlled by men while the daily cooking and maintenance of houses are implemented by women and girls, and care or monitoring of animals (feeding and watering) are insured by young boys. However, cropping tasks related to common fields are generally implemented complementarily by female, male and young. For example, the women and young can be charged for loading donkey charts with manure, the young transport this from homestead to fields, while the men are in charge to spread the manure over the fields. Besides, women realize certain operations normally executed by men in case of labour shortage. Also, women form groups of labour either for mutual work among participating members or to supply daily paid labour to other farms.

Farms’ resources and assets are mainly control by the men. However, a new land law promulgated in 2017 assigns legally 15 % of community lands to the women.

1. **Relationship**[[7]](#footnote-7) **between farmers and their partners in VCs**

Below, the diagrams, in **Error! Reference source not found.**, depict the relationship between farmers and their partners in three VCs, namely maize, milk and sheep. In the diagrams different stages in a VC are represented with different colored boxes vertically superimposed and the red box indicates the cross-cutting relationship of banks and microfinance institutions with other VC partners. In panel (a), it can be noticed that maize VC has 5 stages that include input markets, production, output markets, processing and consumption. A brief description of the relationships is provided in the **Table 1**.

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| **(a) Map of actors in the cereal VC in Southern Mali**    **Legend:**  : Exchange between two links  : Exchange in sheep markets during Tabaski period. | **(b) Map of actors in Milk VC in Southern Mali** |
| **(c) Map of actors in sheep value in Southern Mali** |

**Figure 1:** Simplified maps of actors in the maize, milk and sheep VCs in Southern Mali (only domestic production).

**Table 1: comments on farmers’ relationships with their partners in VCs**

| **VC partners** | **Description of farmers’ relationships and their partners in VCs** |
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| **Maize VC (see Figure 1.a)** | |
| Providers of agriculture services | Providers of services are mainly self-help groups of people (mutual), groups of women providing paid labour in village, business tractor services (labor and transport), services of plowing, weeding and mounding with oxen, and tenants of oxen for a season, and seasonal workers. Currently, it is very difficult to find a seasonal worker because people are more tempted to migrate elsewhere than to stay in Koutiala. |
| Providers of inputs | Actors of this link, mostly collaborating with farmers, are co-operatives of seed producers, agro-dealers and input shops in villages and the Koutiala central market. Also, seed companies produce seeds and sell them to farmers towards mainly cooperative and agro-dealers. Collaboration of a producer with the same supplier is often stable over time, which leaves potential opportunities for the producer, for example, to obtain inputs on credit. In general, the products purchased are fertilizers, seeds, herbicides and pesticides. Input purchases are made throughout season as needed. |
| Farmers, and producer’ organizations | Maize producers are mainly people that produce also cotton. In line with this, most of them have access to inputs for maize cultivation from the Malian Company of Textiles (CMDT) throughout a cooperative of cotton producers (at village level) with. However, apart from this formal organizational setting producers of maize are not often organized for collective actions in villages. Thanks to the efforts of developments projects and to a new law on cooperatives enacted in 2013, initiatives of collective marketing including simple bulk marketing and the systems of warehouse receipts are growing. For example, three out of the four villages investigated (focus group discussion) are implementing one of the collective marketing forms. |
| Market intermediaries | Actors evolved in commercialization (from the production side) of maize grains and other cereal crops are intermediaries in villages (collectors and buyers) and in Koutiala (wholesalers and the semi-wholesalers) and institutional buyers (e.g. World Food Program (WFP) and the Malian marketing board for cereal (OPAM)). Farmers recognize that certain producers agree to give their produce on credit to buyers and collectors working in their village; also certain buyers give money in advance to producers before harvest period. In general sales are individual and occasional, throughout the year depending on seasonal variations; however, the week following the arrival of cotton money there is significantly less selling. Collectors come to the village once a week at the weekly fair. Direct sales to wholesale buyers in Koutiala are not very common. In general it is done once a year for a high quantity or during grouped marketing. Besides, intermediaries have more power in transaction than farmers. In connection with this, farmers assert that when transacting they are the one to ask “for how much will you buy it?”  According to Diallo (2011), the main forms of coordination in cereal markets in Mali are “trade partnerships, spot-markets and various trade networks”.  Maize is available in the market in abundance between October and January, just after the harvest, and between April and May (period of higher price), after which there is less maize on the market. The price varies between 75-130 F CFA according to the seasons. |
| Processors | Modern maize processing is being performed locally by a few existing small milling units at the district level, transforming maize into flour, husked, and breaking of maize. These units are supplied from some local producers. However, this collaboration suffers from the provision of high quality maize grains requested for milling. In addition, due to their low capacity of milling the units collaborate with a limited number of producers. |
| Consumers | The relationship between consumers and maize producers is not straight due to the involvement of many intermediaries between the two nodes and that most consumers are based in cities or abroad, far from production areas. These distant consumers do not collaborate with producers; nevertheless local consumers may have some collaboration with them. |
| Financial institutions | Although there are many banks (e.g. BOA, BNDA, etc.) and microfinance institutions (e.g. Kafo Jiginew, Soroyiriwaso, etc.) locally available to producers, the collaboration between them is very limited. According to Pica-Ciamarra (2005), farmers in rural areas face difficulties to access credit with financial institutions mainly due to the fact that they are mostly poor, generally lack collateral, are spatially scattered and that both parties are subject to high transaction costs. |
| **Milk VC (see** Error! Reference source not found.**b)** | |
| Animal feed market actors | Providers of animal feed are village women and cereal-dehulling units for cereal bran, fodder sellers and shops of livestock feed (price of local cotton cake is 6000 F CFA / bag). Agro-pastoralists also used cereal bran after husking their own production. In addition, farmers grow fodder for cows.  Care and feeding (grazing and watering) of cows are often provided by a Fulani a young boys. However, currently it is very difficult to find herders, because of (1) high cost of entrusting them to a Fulani shepherd, (2) exodus of young people to towns and in informal gold panning sites and (3) scarcity of local hired labor. |
| Providers of veterinary services | In Mali, authorized veterinary agents are the main animal care providers based on a decentralized system that combines provision of public services (e.g. vaccination) and of private services. The use of private services by agro-pastoralists depends mostly on their financial capacity and their awareness of the importance of professional services for better an animal health. Currently, many agro-pastoralists have understood the importance of animal vaccination. However, they prefer to collaborate with agents on an informal basis anchored in the social relationship between them. For example, based on the social relationship agro-pastoralists would prefer the agent to provide services without insisting on claiming his fees and travel expenses. In this relationship, the agent could be, one day, rewarded with a gracious donation in kind or in cash. |
| Agro-pastoralists and their organizations | Agro-pastoralists who produce and sell milk are generally well-endowed farms with a herd of cattle. However, milk production is generally not their main activity. Currently, agro-pastoralists in villages are less organized for milk production, only milk producers from seven villages (Kaniko, Try, Chicolomba, Nampossela, M'peresso, Nitabougouro and Witiena) are grouped at the village level in association, and together in a dairy farmers' cooperative (Danaya Nônô). In last decades, many of these farms have seen the size of their herd greatly diminished, mainly due to lack of grazing lands, split of farms and animal diseases. |
| Market actors of milk | Market players that collaborate with agro-pastoralists are mainly the Danaya Nônô cooperative, direct consumers, Fulani collectors–buyers, shop keepers and women resellers. The milk producers in Nampossela assert, during a focus group discussion, that total milk produced is distributed as follows: 50% is given to Danaya nônô, 30% to the Fulani collectors-buyers and 20% to women resellers. Currently, the Danaya Nônô cooperative is facing high cost of milk collection from its agro-pastoralists collaborators based in villages, because the quantity of milk delivered is low while the salary of its collectors remains the same. Fulani collectors-buyers are also involved in the production, in addition to the collection and sale of milk in the villages and Koutiala individually. The price of milk in the villages varies between 250-350 F CFA / L. |
| Processors | In Koutiala district, milk is mainly processed into various products using traditional (e.g. for butter, cream and curd) and artisanal methods (e.g. for pasteurize milk, stirred yogurt, and fermented milk), by some of the mentioned market actors, such as Fulani collectors-buyers, Danaya nônô and women. The relationship between producers and these actors is similar to the actors described above. |
| Consumers | Fresh milk is much demanded in both villages and Koutiala city. This demand is not covered. |
| Credit institutions | Idem as for maize. |
| **Sheep VC (see see Figure 1.c)** | |
| Animal feed market actors | Feeding of sheep is often ensured by the cutting of Shea tree branches, in addition to cereal bran, cotton cake (with a price of 6000 F FCA / bag, considered too expensive by women) and cowpea fodder. In general, the number of sheep fattened is limited (for example 2 heads), so that the use of feed purchases is also limited. Also, the supply of feed to sheep is not often limited to the sole owner, but other members of farmer are also involved physically and financially. |
| Providers of animal care | Idem as for milk VC. |
| Men,  Women and  Boys | Sheep fattening is practiced in almost all farms, however, it is done mainly by women with one to two heads of sheep, beyond which feeding can be problematic. This activity is often practiced throughout the year with several cycles, however many people do one cycle for the Tabaski festival.  The women from two villages surveyed (Nampossela and Nitabougouro) are organized as cooperative at the village level with legal status. Their cooperatives operate with a system of revolving fund throughout granting of credit to its members over six months at an interest rate of 10%. |
| Market actors of sheep | Sheep market players are mainly local buyers and collectors, and wholesalers from big cities or abroad (less frequent). Collaboration between sheep farmers and buyers is based on the law of supply and demand, and bargaining power in the spot-market. In general, men are in charge of the sale and purchase of sheep.  According to a buyer, the local sheep market suffers from the lack of a large, better-structured livestock market in Koutiala district and the absence of wholesalers from other parts of the country or abroad. This makes the selling of well-fattened sheep very difficult, apart from the day before Tabaski, since wholesalers are the first buyers of these kinds of sheep. In addition, major recognized livestock markets are outside Koutiala city, they are in the surrounding villages (Dogonosso, M'Pessoba and Koro, all about 40 km from Koutiala). The cost of transporting a sheep of medium size worth 50 000 F CFA / head is 250 F CFA / head. |
| Processing | Transformers are butchers, slaughterhouses, restaurants. However, the link between producers and these actors is not direct, therefore very limited. |
| Consumer | In Mali, sheep are used to satisfy a variety of needs (e.g. direct consumption, parties and ceremonies) and specific needs (e.g. for all-white mutton as a sacrifice). From this fact, the price of a sheep depends mostly on the need of the consumer. |
| Credit institutions | Idem as for maize. |
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1. **Collaborations between farmers and their partners in maize, milk and sheep VC in cotton zone of Koutiala.**

The following table gives an overview of constraints, opportunities and risks behind collaborations of farmers with their partners in maize, milk and sheep VCs in southern Mali from three different levels, namely, at individual, organizational and institutional levels.

**Table 2: Constraints, opportunities and risks for farmers in their collaboration with partners in maize VC**

|  | **Constraints** | **Opportunities** | **Risks** |
| --- | --- | --- | --- |
| **At individual level** | | | |
| Provision of inputs and services | Due to imperfections in markets (e.g. credit rationing) and high transaction cost most smallholders, in particular the poorest ones, do not have (or do not have access to) financial resources to buy inputs (e.g. fertilizers), services (e.g. renting tractor for plowing fields) or equipment. | Farmers have access to inputs for maize with the CMDT linked to their cotton cultivation, as well as to state-subsidized inputs.  Currently there is an increasing availability of tractor services, in particular for plowing and transport of organic manure at the beginning of the season. | Risk of opportunistic behavior (e.g. Farmers are often supplied with adulterated fertilizers from the State-subsidy program; this can have negative effect on their production level). |
| Production of maize | Smallholder farmers face difficulties in realizing on time certain key cultivation operations due to the limited financial resources, equipment and labour and/or an overloaded work calendar during the agricultural season.  Soil fertility management.  Low educational and organizational levels;  Limited access to information | Availability of new sustainable Intensification solutions (Falconnier et al., 2016; Traore et al., 2014) targeted and adapted to the local context (e.g. high yield and early maturity maize varieties). Also, compared to millet and sorghum, maize yields more and has the potential for being processed into various derived products.  Producers possess long experience and technical skills in maize cultivation due to efforts from development projects and technical assistance of the cotton company, the CMDT. | Risks of low production due to shocks (e.g. drought, pests or diseases). |
| Marketing of maize grains | In general, individual smallholder farmers are obliged to sell off the maize grains due to, among other factors, limited access to market information combined with their low bargaining power. In addition, when they sell individually a small quantity (for example less than 200 kg) the price is not remunerative.  Volatility of the prices often constitutes barriers to the selling by smallholders;  Most farmers have limited information on the cost of production before selling their produce, which limits their benefit.  Lack of adequate post-harvest handling equipment, which often negatively influences the quantity, quality and therefore also price. | Increasing demand for maize in various markets (e.g. for human consumption domestically, poultry production, processing and exports).  Maize buyers available in villages (collectors and traders) and in Koutiala (the wholesalers and the semi-wholesalers). Certain producers agree to give their produce on credit to traders and collectors working in their village; also certain buyers give money in advance to producers before harvest period.  Sell via cooperative to institutional buyers (e.g. World Food Program (WFP) and the Malian marketing office for cereals (OPAM)). Unfortunately these actors are not buying maize at all currently. Also, a law on warehouse receipt and storing systems is being prepared in order to facilitate cereal commercialization in Mali. | Price volatility;  Risk of bounded rationality (e.g. in front of a remunerative price, certain producers may sell their produce and face food insecurity).  Risk of informational asymmetry between farmers and trader sometime to adverse selection (e.g. trade with buyer that cheats) |
| Processing of maize grains | Initiatives in favor of maize processing have been launched since 80s in the cotton zone of Koutiala with the installation of a dozen of milling units, though the level of industrial transformation is still low. Currently only two of these units are functioning due to constraints related to technology (e.g. maintenance and repairs) and equipment (e.g. low quality of milling), marketing (e.g. processed maize products are not well-known and consumed in Koutiala district) and finance (e.g. low returns to investment due to higher milling and marketing cost).  Existing milling units assert to be confronted with supply difficulties in obtaining good quality maize grains from farmers. | There are two systems of cereal processing in Mali, artisanal and industrial ones. The artisanal system is based on husking and milling maize grains using mortar and pestle manually (generally realized by poor rural women) or using the service of an available milling engine in the neighborhood. As the manual processing requires hard work, the availability of milling engines can be seen as an opportunity to increase maize demand.  Existence of industrial processing units (e.g. currently two out of eight small units are working in Koutiala district and also industrial (e.g. Grands Moulins and Moulins du Sahel) and semi-industrial units exist in other cities) is also an opportunity for an increased maize demand. The processed maize products from industrial processing are well-known and demanded in some parts of Mali, such as Kayes region, Kati, Bamako and the north regions. | Difficulties in collaboration between processors and farmers as processors don’t have a guarantee on getting good quality grains from smallholder farmers so their incentive to collaborate is low. |
| Maize consumption | Consumers of maize are mostly based in cities or in neighboring countries, far from production areas. This situation leads to higher consumption prices, but it does not benefit farmers; because the many existing intermediaries in the markets grasp almost all the added value. Also, the distance between the two nodes limits the flow of market information. | The increasing population, urbanization and income will contribute to more demand in maize and processed maize. Currently, maize and processed maize are demanded from markets of some neighboring countries (e.g. Mauritania and Senegal). Also these products are demanded in big cities (e.g. Bamako) and the northern part of the country. | Price volatility. |
| Access to credit | Smallholder farmers have difficulty obtaining credit due to the lack of capacity to provide a guarantee recognized by banks and micro-finance institutions. | Almost all the existing banks in Mali are represented in Koutiala and in addition some major microfinance institutions (e.g. Kafo Jiginew etc.) are working with farmers in the villages.  Maize growers who are also growing cotton with the CMDT have access to inputs credit. | Risks of over-debt, which may make smallholder farmers more vulnerable. |
| **At organizational level** | | | |
| Organization of farmers at village level | Smallholder farmers have, in general, difficulties to organize themselves for collective actions at village level without external support mainly due to a low educational level, lack of cooperation between themselves based on failure during previous experiences and their heterogeneity in resource endowment and in production objectives. Initiatives of organizations are often targeted to a specific farm activity (e.g. only maize or cereal crops) in isolation from other similar activities that may overlap in certain points (e.g. cereal and cotton), which often limits incentive for collective actions about certain activities. | Cooperatives of cotton producers (SCPC) are available in villages through which most farmers have access to maize inputs with the CMDT (Laris et al., 2015; Ripoche et al., 2015). In addition, some development projects intervening in villages formally or informally organized farmers for grouped marketing of maize grains and other cereal crops towards remunerative marketing channels (e.g. semi-wholesalers and wholesalers) or toward securing warrant. These initiatives for collective action take away, among other, marketing and negotiation costs for farmers.  Farmer cooperatives can participate in more remunerative markets (e.g. institutional markets) with various benefits (e.g. contracts) if they have legal status and satisfy requirements of the unified act of OHADA. | When participating in collective marketing (CM) there is high risk of failure for low resource endowed farmers to spare their produce until the price become remunerative. Also, CM may not work when there is no external support.  Risk of moral hazard (e.g. Bulk selling is often made with a contract; afterwards one of the partners may not respect the commitments (voluntarily or not)). |
| Organization of farmers beyond the village level | At the community or higher level (e.g. district) there are unions of maize producers, but in general the relationship is poor between the summit and the base composed of member cooperatives and farmers. Also, most unions face difficulties to run independently without external support. On top of that, legalized unions often do not meet requirements of the current law on cooperatives (unified act of OHADA) to sell in remunerative markets with contracts and premium, such as institutional markets (e.g. WPF and OPAM). | Existence of maize producers of different levels defending their interests. At the district level, there are unions of maize producers or an inter-profession composed of all important actors intervening in the VC of maize. Similar organizations exist at higher levels. These organizations play advocacy roles with the government or other development partners. Also, they can be used to collect various data, including information on stocks of maize grains for collective marketing with institutional buyers (e.g. WPF and OPAM) at the community level. | Withdrawal of institutional buyers from the maize market or non-demand of maize grains from these actors, in which case farmers may fail to sell collectively via the unions.  Dislocation of the unions in absence of external support. |
| **At institutional level** | | | |
| Formal institutions | In Mali, government offices or departments intervening in the agricultural sector often fail to coordinate their missions, which complicates addressing certain bottlenecks.  Existence of divergence between traditional and modern logics (e.g. dual logic of subsistence agriculture and the entrepreneurial logic promoted by the new cooperative’s laws). Also modern laws often put more hurdles (heavy bureaucracy and long administrative procedures) to the involvement of smallholders in certain opportunities. Also, management of state subsidy is not always transparent, due to corruption and bribes.  According to Theriault et al. (2012) past institutional changes in the Malian cotton sector (e.g. restructuring of the CMDT) have undermined most existing local institutions (e.g. access to advisory and teaching to read and write). | Mali belongs to sub-regional organizations (e.g. [Economic Community of West African States (ECOWAS)](http://www.ecowas.int/)) offering profitable market access.  At the national level, regulatory and legislative texts as well as elaborated policies are available to support the government vision for agricultural development (e.g. Agricultural Guidance Law (LOA), Agricultural Land Law (LFA), uniform acts of the OHADA, law on agricultural seeds).  Recently the government decided to allocate 15% of the state budget to the agriculture sector in Mali. Besides, since 2009, chemical fertilizers and seed of cereal crops are subsidized at 50% of initial prices; in addition of the subsidization of agricultural machines. |  |
| Informal institutions | Exodus of young people to cities and gold mining sites due to a decreased interest in agriculture as a vocation.  Most farmers in southern Mali rely mostly on cotton income since cotton receives more attention socially than other crops such as maize. | Positive institutional change towards more market-oriented behavior (e.g. grow maize and sell to food buy other food or increased willingness to have access to credit) as well as to follow diversification strategies that can lead to food self-sufficiency and market participation (e.g. growing maize and other cereal crops). | Risk of inter-generational conflicts between old and young people around decision making on farm management as the communities in southern Mali are highly patriarchal. |

**Table 3: Constraints, opportunities and risks for farmers in their collaboration with partners in milk VC**

|  | **Constraints** | **Opportunities** | **Risks** |
| --- | --- | --- | --- |
| **At individual level** | | | |
| Provision of inputs (e.g. animal feed) and animal care services. | Most producers do not have means to buy complements of feed or grow fodder for milking cows (e.g. oil cake or fodders), in particular during the dry season from April to June (Rigourd et al., 2017), characterized by an insistent lack of feed and its consequences on the productivity of cows (Cibils et al., 2015). They often lack willingness or misunderstand the importance, to ask and pay for professional animal care services, which may exacerbate certain cases of diseases and lead to death of cows. | Complements of animal feed are available from animal feed makers and traders in the villages.  It may be possible for producers to obtain complements of animal feed for cows based on selling contract with marketing partners (e.g. Danaya nônô);  Professional representatives providing animal care services are available locally. | Poor quality of complements of feed for milk production.  Cows’ diseases or death due to lack of willingness to ask for professional care services.  Faulty veterinary medicines bought from non-certified sellers. |
| Production of milk by agro-pastoralists. | Milk production is only undertaken by a few well-resource endowed farms with large herd size and a few other farmers.  Milk production and productivity are limited currently (Cibils et al., 2015) due to factors, as :   * Declining communal grazing lands; * Scarcity of water for cows’ watering * Most farmers lack (1) labour (in particular during the harvest period to harvest in time both fodder and other crops without causing damage to one of them and taking care of cows for feed and watering), (2) financial means, and (3) land to grow fodder crops; * Farmers often lack strategies to produce more good quality fodders for cows, as dairy is not often the main activity; * Local breeds (Zebu and N’Dama) used for milk production have limited productivity; * Low educational and technical levels of farmers; * Outbreak of animal diseases; and * Lack of partners capable to provide farmers with feed and incentive to produce more milk. | Cultivation of fodder crops well-adapted to the local conditions (e.g. cowpea) ;  Available feeding strategies (e.g. stall feeding or supplementation after grazing) adapted to the local context;  Research conducted in the villages with farmers showed that is possible to increase milk productivity of local breeds of cows until 1.5 l/day/cow by adopting stall feeding (Sanogo et al., Submitted);  Artificial insemination of cows is being used to improve milk productivity of local breeds. Also, it is possible to transform cereal crop residues into digestible fodder for animal feeding through chopping and urea treatment. | Outbreak of animal diseases;  Producers may not be able to adequately take care of improved breeds, then may fail to produce accordingly;  Also they may fail to adopt fodder crops and feeding strategies as production of milk is not their main activity.  Farmers often feel that it’s risky to adopt a (sustainable) option that they know little about in the local context.  Lack of labour during the harvest time may cause damage to fodder crops when they are not harvested on time. |
| Marketing of milk | Seasonal fluctuation in milk production put more difficulties on collaboration between producers and traders; because, the period of higher supply coincides with the period of low demand and vice-versa. This situation leads to price volatility and sometimes to slump in sales during period of abundance (from June to October). During the abundance period cooperatives or trading partners often impose a periodic quota of milk or ask farmers to stop supplying entirely. In the case of a cooperative, if it keeps accepting milk from its members and pay them accordingly each month it may face cash flow problem, then delayed payment and finally collaboration difficulties (e.g. high transaction cost for collecting small amount of milk). This was the case of a local cooperative, Danaya Nônô, and the problem was exacerbated when its members started not supplying all amount of milk produced to the cooperative because they lack money to buy feed for cows.  Smallholders selling in villages, to local traders, assert that although this channel is remunerative it’s very difficult for them to save money and buy complements of feed for the dairy cows. | There are various marketing channels and actors for dairy commercialization. For example, collector and retailors (women, shops and others) are evolving at the village level; dairy units, mini-dairies and shops in secondary cities, such as Koutiala; shops, supermarkets, semi-industrial and industrial units in big cities such as Bamako.  Also, the number of dairy cooperatives and mini-dairies are increasing, thanks to the effort of development initiatives nation-wide or locally (e.g. PRODEVALAIT and PAFLAPUM), as well as the raising demand of dairy products from both villages and cities.  Dairy cooperatives and mini-dairies are working on marketing and on processing with farmers involved in milk production around the cities, such as in Koutiala city. In this collaboration farmers may get access to inputs (e.g. animal feed and care).  Local traders buy milk in villages with smallholders and sell it in neighboring villages or in Koutiala city. The proximity of these buyers to farmers saves them time, as they accept collecting milk in cowsheds. | High risk of slump in sales during the period of milk abundance.  High risk of collaboration difficulties, due to for example :   * Delayed payment of milk money; * Withdrawal of key development partners (e.g. external support); * Exit from market of a key marketing partner. |
| Milk processing | The low level of local dairy production makes processing very difficult from fresh milk to milk powder which can be kept easily for a long time. Also, other dairy products from milk processing are not well-known in Mali.  Lack of adequate equipment for milk processing in combination with the competition between imported dairy produce and the local industry. | Increasing number of dairy cooperatives and mini-dairies involved in milk processing around cities, such as Koutiala, which may provide incentive to smallholders to produce more milk for these units of transformation. | Idem as the previous |
| Milk consumption | Milk and processed dairy produce do not form part of the cultural eating habits in Mali in general, mainly due to the fact that these products are not well-known by the majority of consumers, which limits their demand. Also most people satisfy their needs for milk from imported powder milk as this can be saved for a long time. | Increasing demand of milk and processed milk from both villages and cities. | Risk of price volatility. |
| Access to finance and credit by agro-pastoralists | Producers of milk also have difficulty to obtain credit with banks and micro-finance institutions due to, among other factors, the lack of capacity to provide recognized collateral, the high transaction costs (e.g. high interest rate) and the asymmetric information (e.g. farmers’ limited knowledge on credit conditions). Also, heavy bureaucracy and the long procedure for credit demand often limit smallholder farmers’ access to credit. | Major banks and microfinance institutions that finance specifically agricultural activity (e.g. BNDA and Kafo) are present in Koutiala.  Also most of dairy producers possess large size of herd from which they can sell some animals to buy feed for milking cows and for other needs. In addition, if a farmer is member of a dairy cooperation it may be possible to obtain credit via the cooperation. | High risk of over-debt |
| **At organizational level** | | | |
| Organization of agro-pastoralists at village level | In villages of Koutiala district the number of producer groups organized for collective action is limited, because they face difficulties to undertake those initiatives without external support due to, among other factors cited previously for maize, their limited number (less than 5 %) at this level. | Milk producers from a limited number of surrounding villages of Koutiala are first organized at village level as a group and then as a dairy cooperative (Danaya nônô) located in Koutiala and working in milk collection, processing and marketing for its members.  If this collaboration works smallholder farmers may have access to credit, information, and feed for cows, and other advantages, such being helped by development projects. | High risk of governance issues between leaders and members of the cooperative. |
| Organization of agro-pastoralists beyond the village level | In southern Mali, an organization targeted to milk production existed (e.g. former form of Danaya and its network). But, this organization declined due to internal problems faced by Danaya nônô and there consequences on collaboration with smallholder farmers in the network.  Besides, agro-pastoralists are first concerned with cultivating crops; therefore, initiatives for collection action may lack their involvement. Also, they may not be motivated to follow certain strategic decisions of a cooperative. | Currently there is a union of milk producers that include 3 milk cooperatives of Koutiala district and one of Yorosso district. Also similar organizations exist at higher levels (e.g. a federation at the regional level and a national federation at the country level).  Satisfying requirements of the unified act of OHADA provides cooperatives of farmers with various benefits (e.g. better access to markets, including credit and produce). |  |
| **At institutional level** | | | |
| Formal institutions | Local dairy production is confronted with the competition from imported dairy products as trade is liberalized in Mali.  In Mali frequent change of ministry leads to change in governmental actions as a new ministry may set new priorities with new plans of actions, which are often different from previous ones. This may prevent farmers to obtain an expected favor from the previous plans (e.g. animal feed is subsidized since 2014/2015 but farmers assert that they never got anything until now).  Non-application of legislative texts promulgated (e.g. pastoral charter), because of a lack of other texts or organizational settings that support their implementation.  Absence of coherent elaborated policies on livestock as well as a limited allocation of financial resources to livestock sectors (CREDD, 2016).  Institutional changes in the Malian cotton sector (Theriault & Sterns, 2012), led to the exit of a local factory in charge of producing animal feed, as well as interruption of some supports from the CMDT (e.g. access to animal feed on credit). | Mali is member of an economic integration area at the sub-regional level (e.g. ECOWAS), and there are promulgated regulations, laws and policies at the national level (e.g. Agricultural Guidance Law (LOA), Agricultural Land Law (LFA), uniform acts of the OHADA, national strategy dairy sector development).  ECOWAS is mobilizing efforts and resources for the development of local dairy towards toward a movement called “milk offensive”. In addition, governmental and decentralized institutions (e.g. municipality) as well as local NGOs and development projects (e.g. WAPP-2A and PAFA) are working subsequently towards the development of local dairy sector. Furthermore, the government started since 2014 subsiding at 30% all purchases of animal feed via cooperative or artificial insemination, in addition to the traditional public vaccination against certain animal diseases. | Political and safety instability.  Possible sustainability issues linked to development initiatives (e.g. government subsidies). |
| Informal institutions | Culturally, processed milk products are not well-known and consumed in southern Mali.  In southern Mali, the livelihood’s strategies of smallholders is mostly based on cropping rather than livestock, which makes milk production a secondary activity for most agro-pastoralists. This fact is often anchored in the mindset of some smallholders to a degree that prioritizing livestock over cropping activities may be socially blamed by others. | Social, customary and traditional institutions are willing to contribute to local development initiatives; therefore they can play leadership roles to make people more sensitive for local dairy development. Increasing interventions of development projects has also increased people’s willingness to be involved. In addition, some farmers started to show interest in milk production as income generating activity. | The development of local dairy sector may likely negatively influence the position of women in milk marketing and processing in villages, as they were the first actors in these activities (Rigourd et al., 2017, p. 42). |

**Table 4: Constraints, opportunities and risks for farmers in their collaboration with partners in sheep VC**

|  | **Constraints** | **Opportunities** | **Risks** |
| --- | --- | --- | --- |
| **At individual level** | | | |
| Provision of inputs (e.g. animal feed) and veterinary care services | People who keep sheep within farms are men, women and young. Most of them lack financial resources, in particular the women and young people, to adequately feed, provide veterinary care and shelter against bad weather (which causes diseases or death). This situation can also be explained from the high cost of inputs and services as well as the high transaction cost associated with buying these by smallholders. | Complements of feed can be bought from feed providers both in villages (e.g. traders of fodder and cereal bran) and in Koutiala city.  Veterinary care is available locally.  Also availability of edible tree leaves, crop residues and cereal bran after shelling, which are good options for feeding sheep. | Risk of animal disease and death from bad weather. |
| Sheep keeping within smallholder farms | Most of smallholder farmers want to exercise sheep fattening, in particular women and young people, but do not always have money to buy a ram for fattening. Additionally, they may face difficulty in feeding sheep due to, among other factors, declining grazing land, insufficient quantity of fodder produced and lack of money to buy complements of feed. In addition, boys are often in charge of collecting leaves of trees and other fodders for sheep, but they are not always available for this. Theft of sheep is also frequent. | Farmers, and in particular, women and young, have long experience in keeping and fattening sheep (as this was promoted by the CMDT since 1980). The fattening activity also benefits from the availability of cereal residues, cereal bran, cowpea and peanut leaves from own production or purchasing from other smallholders. In addition, availability of space to keep and feed sheep is also an opportunity. | Risk of outbreak of animal diseases and deaths.  Risk of drought or flood; |
| Selling of fattened sheep within smallholder farmers | It is difficult to receive remunerative price outside of the Tabaski period, because there is a low demand of better fattened rams, which makes fattening a periodic activity, only six months per year. Sheep keeping is mainly undertaken by women, but they may not take full advantage of the money from the sale, as this is generally realized by a man who gives back an amount of money that may not necessarily correspond to the right amount.  In addition, smallholder farmers are often confronted with high transaction cost (e.g. due to absence of big livestock market in Koutiala city in which buyers from other big cities can be found) in combination with their low bargaining power, compared to local market intermediaries (e.g. collectors and other traders).  Furthermore, smallholder farmers sell fattened sheep without really knowing the cost supported from this activity, therefore, they may sell with loss. | High demand for sheep meat domestically and from some neighboring countries due to, among other factors, increased population and income. In addition in Mali as well as in the neighboring countries, sheep is used for various purposes including sacrifices for religious reasons (e.g. Tabaski) and social events (e.g. baptismal ceremony). Therefore, the demand for sheep occurs over the year, nevertheless the price of rams is more remunerative in the eve of Tabaski both domestically and in neighboring countries. | High price variability and risk of opportunism behavior of traders due to asymmetrical information between them and farmers (e.g. farmers have limited information on the markets of livestock in combination with their low bargaining power in negotiation, which may negatively influence their benefit). |
| Processing of sheep | Butchers and slaughterhouses are the main actors in this link. However, the relationship between farmers and these actors is limited and less frequent. Also, most consumers (for different purposes, including sacrifices and social needs) prefer to buy living sheep rather than processed products. | The Malian government encourages initiative of transformation of livestock towards building adequate storage and conservation infrastructures (e.g. “Abattoir frigorifique de Bamako” and “LAHAM industries”) in order to increase export. |  |
| Consumption of muttons or rams |  | Sheep, in particular rams, is used for various purposes including consumption from direct slaughters, sacrifices (e.g. Tabaski and others), social events (e.g. baptism). |  |
| Access to credit | Farmers have difficulties to obtain credit from formal financial institutions in general due to their lack to provide recognized collateral. However, the case of women is even more insistent, because they have less bargaining power than men on use and allocation of the household’s resources. Also, the high transaction cost (e.g. 16 % of interest rate in Mali with microfinance institutions) linked to credit and asymmetric information between financial institutions and farmers limit their access to credit. | Microfinance institutions exist and are working closely with farmers in villages (e.g. Kafo Jiginew, Soro yiriwaso). Also, a national strategy for microfinance development exists since the 1988. This policy insists particularly on the access of women to credit to undertake cash generating activities  Besides, women are often organized in informal groups for savings and credit. | Risk mismanagement leading to over-debt. |
| **At organizational level** | | | |
| Organization of farmers at village level | In southern Mali, people mostly consider small ruminants as a buffer. Keeping small ruminants is an activity that is disparately practiced by various members of households. This makes it a secondary activity for which it is difficulty to organize collective action. Furthermore, successes in collective actions without external support are limited in southern Mali, mainly due to the high heterogeneity in resource endowment and objectives among farmers. | Collective action offers various opportunities to farmers, including grouped marketing for better remunerative price. In southern Mali, grouped marketing allows women to sell directly their sheep to traders without involving a man. Therefore, this allows them to fully grasp all the money they receive. |  |
| Organization of farmers beyond the village level | There is no organization targeted only to sheep keeping at higher level, possibly due to the fact that this activity does not play a primary role in the livelihood strategies of farmers. | Organizations of livestock keepers at higher level (e.g. ULFBV “union locale de la filière bétail et viande”), but these are mostly composed of beef producers. |  |
| **At institutional level** | | | |
| Formal institutions | Nationally, there is no clear policy or strategy targeted to sheep VC development.  Most existing regulations and legislative texts on livestock are not really implemented because of the lack of other supporting texts (e.g. pastoral charter) and limited government resources for their implementation.  The restructuring of the CMDT (Theriault & Sterns, 2012) caused the end of development initiatives targeted to women such as provision of credit for sheep fattening. | Mali is member of Economic Integration areas at sub-regional level (e.g. ECOWAS), which offer an opportunity to expand its markets, resulting in the potential to increase the domestic production.  The national regulatory frame on agriculture and livestock also encourages sheep keeping (e.g. Agricultural Guidance Law (LOA)). | Political and safety instability. |
| Informal institutions |  | Currently heads of households are more favorable to private initiatives of members, including sheep fattening of women. |  |

1. **Conclusion**

Our research investigated the relationships between farmers and their partners in maize, milk and sheep VCs in the cotton zone of Koutiala (Mali) using the VC concept. After, the reasons explaining the degree of collaboration between farmers and other VC partners were explained at three different levels (i.e. individual, organizational and institutional dimensions) using transaction cost economics as theoretical background. Investigations have been conducted between December 2017 and February 2018 using Focus Group Discussions (FGD), key informant interviews and semi-structured interviews with VC actors.

Partners are vertically linked, in the VC of maize, across five stages from input provision to consumption. On the one hand, upstream partners of famers are providers of agricultural services and input providers. The first set of actors include (1) mutual self-help groups of people, (2) women groups for paid work, (3) business tractor services, (4) services of plowing, (5) services of weeding and mounding with oxen, (6) tenants of oxen for a season, and (7) seasonal workers. Input providers are (1) agro-dealers, (2) input shops, (3) seed cooperatives, and seed companies. On the other hand, downstream actors are mainly market intermediaries in villages and in Koutiala market. However, farmers occasionally collaborate with processors and consumers. Another partner of farmers is credit institutions, but the collaboration between them is limited, not only for maize but also for the other VCs.

The network of relationship between partners in the VC of milk has four stages, from input provision to consumption. Upstream, agro-pastoralists collaborate with animal feed providers, composed of (1) women selling bran cereal after de-hulling (2) fodder sellers and (3) shops of animal feeds, and suppliers of animal care services mainly exercised by authorized professionals. Downstream, they collaborate with different market players, which include (1) mini-dairies as cooperatives, (2) direct consumers, (3) Fulani collectors–buyers, (4) shopkeepers and (5) women resellers, and processors who are the same market actors.

The relationships of sheep keepers with other VC partners take place also within a network of five stages. Upstream, sheep keepers mostly rely on their own fodder production and forage available locally (e.g. leaves of Shea tree), but sometimes buy complements of feed (e.g. cotton cake) with animal feed shops. Their collaboration with suppliers of animal care services is similar to milk VC. Downstream, collectors and buyers in villages are the main actors with whom sheep keepers collaborate.

Our findings suggest that the relationships of farmers with their collaborating partners, in the individual mentioned VCs, depend mostly on constraints, opportunities and risks at the three levels (i.e. individual, organizational and institutional levels). The maize VCs is mainly confronted with marketing problems from individual selling by farmers, the low organizational level for collective actions and also the absence of adequate enabling institutions. The milk VC is facing feeding challenges (i.e. feed and water), which considerably limit cows’ production as well as the well-functioning of milk market and processing. The challenges simultaneously originate at individual, organizational and general institutional levels involved in milk production in Mali. Sheep keeping is mostly exercised by women and young people who do not likely have control on the farm’s resources; therefore they often lack the money to undertake this activity. Beyond the individual level, sheep keepers are also confronted with issues related to lack of organizational support for better access to credit.

Our study is mainly based on a qualitative assessment, with triangulation of information from various sources, which gives a better picture of the current situation in terms of the collaborations between smallholders and their partners in the mentioned VCs. Based on this, the quantification of the degree to which constraints, opportunities and risks affect the collaborations could be a future step.

This study identified relevant partners with whom smallholder farmers vertically collaborate in the VCS. Various actors intervening in the old cotton zone of Koutiala (e.g. policy makers, development agents and researchers) can use our findings as a basis to co-design feasible institutional changes in the partnerships in order to improve the bargaining position of farmers. Additionally, findings related to farming activities can be used to identify the most relevant constraints, opportunities and risks currently faced by smallholders in order to design solutions to improve their production and productivity.

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1. The data were provided by the CMDT and the calculations were made by the author. [↑](#footnote-ref-1)
2. These figures are not as reliable as they are estimated from data from the last livestock census conducted in 1991. [↑](#footnote-ref-2)
3. Idem as the previous. [↑](#footnote-ref-3)
4. Based on AfricaRising Sustainable Intensification Assessment Framework. [↑](#footnote-ref-4)
5. Information provided here is based on my own date collection and observation, and then supported by other research findings. [↑](#footnote-ref-5)
6. The following words will be used interchangeable even though there are some differences in their definitions: Smallholder farmers, farmers, producers, agro-pastoralist, and sheep keepers. [↑](#footnote-ref-6)
7. Relationships that are described here include only partners collaborating directly with farmers within the farming systems of the cotton zone of Koutiala. [↑](#footnote-ref-7)